Patent claims

1. A turbomachine (1) with a rotor (3) and with a stator (5), a flow duct (7) being formed for an action fluid (A) by means of which the rotor (3) can be driven, characterized by a magnet (9) for generating a predeterminable magnetic field (B) in the flow duct (7).

2. The turbomachine (1) as claimed in claim 1, characterized in that the stator (5) has the magnet (9).

3. The turbomachine (1) as claimed in claim 1 or 2, characterized in that the magnetic field (B) is directed radially.

4. The turbomachine (1) as claimed in claim 3, characterized in that the magnetic field (B) has at least one sign change along the axis of rotation (11) of the rotor (3) with respect to the radial direction.

5. The turbomachine (1) as claimed in claim 1, 2, 3, or 4, characterized in that an axially extending magnetic guide blade region (15) with a constant sign of the magnetic field and an axially extending magnetic moving blade region (17) with a sign of the magnetic field (B) which is opposite to that of the guide blade region (15) are provided.

6. The turbomachine (1) as claimed in claim 5, characterized in that the magnetic moving blade region (17) follows the magnetic guide blade region (15) axially in the flow direction of the action fluid (A).

7. The turbomachine (1) as claimed in claim 5 or 6, characterized in that a number of magnetic guide blade regions (15) and moving blade regions (17) are arranged alternately along the axis of rotation (11).

8. The turbomachine (1) as claimed in claim 5, 6 or 7, characterized in that, for the spatial delimitation of the magnetic field (B) in the magnetic guide blade region (15), the stator (15) has a radially inwardly extending circumferential ring (29A).

9. The turbomachine (1) as claimed in claim 5, 6, 7 or 8, characterized in that, for delimiting the magnetic field (B) in the magnetic guide blade region (15), the magnetic guide blade region (15) comprises a radially inwardly extending projection (19) of the stator (5).

10. The turbomachine (1) as claimed in claim 9, characterized in that a plurality of radially inwardly extending projections (19) are arranged over the entire circumference of the stator (5).

11. The turbomachine (1) as claimed in one of claims 5 to 10, characterized in that, for the spatial delimitation of the magnetic field (B) in the magnetic moving blade region (17), the rotor (3) has a radially outwardly extending circumferential ring (29B).

12. The turbomachine (1) as claimed in one of claims 5 to 11, characterized in that, for delimiting the magnetic field (B) in the magnetic moving blade region (17), the magnetic moving blade region (17) comprises a radially outwardly extending projection (21) of the rotor (3).

13. The turbomachine (1) as claimed in claim 12, characterized in that a plurality of radially outwardly extending projections (21) are arranged over the entire circumference of the rotor (3).

14. The turbomachine (1) as claimed in one of the preceding claims,
characterized by an ionization device (23) for the generation of charged particles (25) in the action fluid (A).

15. The turbomachine (1) as claimed in one of the preceding claims,
characterized by a recombination device (31) for the recombination of charged particles (25) in the action fluid (A).

16. A method for operating a turbomachine (1) with a rotor (3) and with a stator (5) and with a flow duct (7), in which an ion-containing action fluid (A) flows through the flow duct (7), and a defined magnetic field (B) is generated in the flow duct (7), ions (27) being deflected in the magnetic field (B).

17. The method as claimed in claim 16, characterized in that the rotor (3) is set in rotation as a result of the deflection of ions (27) due to interaction with the magnetic field (B).

18. The method as claimed in claim 16 or 17, characterized in that a radial magnetic field (B) acting on the ions (27) is generated in the flow duct in such a way that the tangential velocity component (v) of the ion-containing action fluid (A) is influenced in an accurately directed manner when the latter flows through the flow duct (7).

19. The method as claimed in claim 16, 17, or 18, characterized in that a radial magnetic field (B), which alternates along the flow direction of the ion-containing action fluid (A), is generated in the flow duct (7).

20. The method as claimed in one of claims 16 to 19, characterized in that the magnetic field (B) is regulated in time and/or spatially.

21. The method as claimed in one of claims 16 to 20, characterized in that the ion-containing action fluid (A) is formed by the ionization of particles in the action fluid (A) before the flow of the latter through the flow duct (7).

22. The method as claimed in one of claims 16 to 21, characterized in that ions (27) are formed by the ionization of particles in the action fluid (A) during the flow of the latter through the flow duct (7).

23. The method as claimed in one of claims 16 to 22, characterized in that ions (27) are formed by collision ionization.

24. The method as claimed in one of claims 16 to 23, characterized in that ions (27) are formed by radiation ionization.

25. The method as claimed in one of claims 14 to 24, characterized in that the action fluid (A) is purified of harmful substances in a recombination process and/or a catalytic process.

26. The method as claimed in claim 25, characterized in that purification is carried out during and/or after the flow through the flow duct (7).